proper and fitting caption of such a dissertation, it seems to me, would be "What can they not do?"

Fellow workers, companions in research, I profoundly believe that research must mean a different thing after we are through with these passing days of frightfulness. It was counted upon by Germany as her greatest asset. It must prove to be America's bulwark of defense. It has been sufficient in the past that your impulse has been the search for truth for truth's sake. It is inevitable that that impulse must now be raised to an inspiration with a very passion for truth for humanity's sake. As you have worked unwittingly, but none the less effectively for preparedness, so may it be your part to work unremittingly and with equal effectiveness towards the building again of the temples of peace, to turning the dark clouds inside out and contributing to the greater successes of a better day.

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THE NEW HOPKINS MARINE STATION OF STANFORD UNIVERSITY

The project of the development of a marine biological laboratory in connection with Leland Stanford Junior University owes to its origin to Professor Charles Henry Gilbert and Professor Oliver Peebles Jenkins. Recognizing the value and importance of such a foundation, they set actively to work during the first year (1891) of the University to secure its realization. After a careful examination of various sites along the coast, Pacific Grove, upon the southern side of Monterey Bay, was selected as combining the most desirable features. Through the generous cooperation of the Pacific Improvement Company a suitable site and a sum of money sufficient to erect the first building was donated. A plain two-story frame structure, twenty-five by sixty feet in ground dimensions was erected on Point Aulon, a low rocky headland, and the first session of the new laboratory was held during the summer of 1892. In recognition of the active interest and liberality of Mr. Timothy Hopkins the station was named the Hopkins Seaside Laboratory. Funds for the purchase of books and equipment were provided by him from time to time, and in the following year he erected a second building. The two buildings contained four general laboratories, a lecture room, seventeen private rooms, and a large concrete basement for special physiological work. The salt-water piping for the aquaria in the second building was constructed of pure block tin throughout, with hard-rubber stopcocks.

During the first twenty-five years of its existence the laboratory while nominally a part of the university and freely using its library and apparatus, was dependent for its upkeep and extension chiefly upon student fees and private gifts, the latter mainly through the constant sympathetic interest of Mr. Hopkins. Despite these limitations it offered its facilities to many investigators and students during that period, and contributed materially to the solution of biological problems on the Pacific coast.

With the passing years it became increasingly evident that the site upon Point Aulon was inadequate to the needs of the laboratory. In 1916, through the efforts of President Wilbur and the Board of Trustees, a new location was secured nearly five acres in extent and comprising the main portion of Almeja or Mussel Point, situated a half mile eastward of the old site. This point will be recalled by former visitors to the Seaside Laboratory as that upon which the fishermen of the picturesque "Chinatown" used to dry their large catch of squids. Chinatown disappeared in a blaze about fourteen years ago, and was never rebuilt. The new situation insures complete control of the coast line of the point, including an excellent sheltered landing place and harbor for boats of considerable size (used in the old days by Chinese fishermen).

Close to this cove the first building of the new station was erected during 1917. It is of reinforced concrete construction approxi-

mately forty-one by eighty-four feet over all and of a height of three stories. On the ground floor is a physiological laboratory, twenty-three by thirty-nine feet, containing a large floor aquarium of cement, six by fourteen feet, a private laboratory, ten by eleven feet, also a concrete-floored room twenty-three by thirty-nine feet for sorting collections, and for the storage of boats, collecting apparatus, etc. There are, besides, a large storeroom, furnace room, janitor's room, photographic dark room and men's lavatory.

The second floor, into which the main entrance opens, is devoted to the three large general laboratories, two of them approximately twenty-three by thirty-nine feet, the third twenty by thirty-six feet, and accommodating each twenty-eight students. Two private laboratories for instructors are also provided on this floor.

The third floor contains a large library with a generous fireplace, an adjoining room for records, an advanced laboratory, twenty by twenty-two feet, six commodious private laboratories for investigators, and a rest room for women. Fresh and salt water are supplied to each laboratory, the sea water being pumped to a concrete tank on the roof, whence it is distributed to the various double-decked, cement aquarium tables. Heating is provided by a hot-air system, electric lights are installed, and gas soon will be. From the third floor a stairway gives access to the flat, parapeted roof, where open air aquaria may be set up as needed. There are thus five laboratories available for classes and nine private laboratories for investigators. The private rooms have much the same equipment as that used at the new Woods Hole Marine Biological Laboratory.

The plans for the Station are very largely the work of Professor Frank Mace McFarland, of the Department of Anatomy, in conference with Professor Charles Henry Gilbert, of the Department of Zoology.

In fitting recognition of the aid rendered by Mr. Timothy Hopkins during the whole life of the Station, the Board of Trustees of the university named the new institution on October 26, 1917, the "Hopkins Marine Station of Stanford University."

The Hopkins Marine Station fulfills a twofold function: first it furnishes under exceptional natural advantages elementary and advanced instruction in biology, second, it provides for research work. Beginning June 15, 1918, the Station will be open the entire year, the Director being in residence. Investigators and special students can be accommodated at any time. Regular classes are scheduled for the spring (April 1 to June 18) and summer (June 19 to August 30) quarters only. As formerly, the use of Station facilities is tendered to investigators free of charge; students are required to pay a small fee.

The Station is an integral part of Stanford University, controlled by the board of trustees, the president, and the academic council in the same manner as other departments of the university. In addition there is a small committee of the faculty exercising advisory and to a certain extent executive functions. The staff consists of the director and those members of the faculty who offer regular courses of instruction at the station.

The extraordinarily rich fauna and flora of the Monterey Bay region offer exceptional opportunities to investigator and beginning student alike. There are a surprisingly large number of marine animals and plants readily accessible. The student of land forms will encounter a varied assemblage of species, since there are very few regions of equal extent which offer such a curious combination of widely diverse ecological formations. There are probably a greater number of endemic plants than in any other similar continental region. Investigators in the fields of general experimental work, taxonomy, anatomy and embryology will find a wealth of material to chose from, while those concerned with a study of animals or plants from the special standpoint of their "marineness" will naturally be exceptionally favored.

During the summer quarter (June 19 to August 30, 1918) courses will be offered as follows: General Zoology, by Professor E. C. Starks; Economic Zoology (Marine Inverte-

brates) and Invertebrate Embryology, by Professor Harold Heath; General Physiology and Research in Physiology, by Professors E. G. Martin and F. W. Weymouth; The Algae and an advanced course in Botanical Survey, by Mr. J. I. W. McMurphy.

President Wilbur has appointed W. K. Fisher, of the Department of Zoology, director of the station.

W. K. Fisher

SCIENTIFIC EVENTS

THE BOMBARDMENT OF PARIS BY LONG-RANGE GUNS

Professor G. Greenhill writes in *Nature* that the Jubilee long-range artillery experiments of thirty years ago were considered the *ne plus ultra* by the British authorities, and were stopped at that, as they were declared of no military value. But the Germans are said to have watched the experiments with great interest, and to have carried the idea forward until it has culminated to-day in his latest achievement in artillery of a gun to fire 75 miles and bombard Paris from the frontier. Professor Greenhill writes:

From a measurement of the fragments of a shell a caliber is inferred of 240 mm., practically the same as the 9.2 inch of our Jubilee gun, which, firing a shell weighing 380 pounds at elevation 40°, with a muzzle velocity nearly 2,400 feet per second, gave a range of 22,000 yards—say, 12 miles. This was much greater than generally anticipated, but in close agreement with the previous calculations of Lieutenant Wolley Dod, R.A., who had allowed carefully for the tenuity of the air while the shot was flying for the most part two or three miles high.

The German shell is likely to be made much heavier and very nearly a solid shot, better by its weight to overcome air resistance, the chief factor to be consdered in the problem of the trajectory. If it was not for this air resistance a range of 75 miles with 45° elevation could be reached, on the old parabolic theory of Galileo, with so moderate a velocity as $V = \sqrt{(gR)} = 3{,}200$ feet per second, with $g = 32.2$, $R = 75 \times 5{,}280$; in a time of flight of about $2\frac{1}{2}$ minutes, an average speed over the ground of 30 miles per minute.

A velocity of 3,200 feet per second was obtained by Sir Andrew Noble in his experiments at Newcastle about twenty years ago with a 6-inch 100-caliber gun, with a charge of $27\frac{1}{2}$ pounds of cordite and a shot of unspecified weight, so it may have been the usual 100 pound or perhaps an aluminium shot of half the weight.

Double velocity is usually assumed to carry twice as far; at this rate the velocity of our gun would require to be raised from 2,400 feet to about 6,000 feet per second to increase the range from 12 to 75 miles; such a high velocity must be ruled out as unattainable with the material at our disposal.

But in this range of 75 miles the German shot would reach a height of more than 18 miles and would be traveling for the most part in air so thin as to be practically a vacuum, and little resistance would be experienced.

So it is possible a much lower velocity has been found ample, with the gun elevated more than 45°, for the shot to clear quickly the dense ground strata of the atmosphere. Even with the 3,200 feet per second velocity obtained by Sir Andrew Noble a surprising increase in range can be expected over the 12-mile Jubilee range when this extra allowance of tenuity is taken into account, and a range of 60 miles be almost attainable.

SOME TUNGSTEN ORES IN THE NATIONAL MUSEUM

For some years the department of geology in the United States National Museum has been making a special effort to build up its collections of the so-called rare earths and rare metals, many of which have assumed exceptional importance since the outbreak of the war. These collections include a considerable range of substances which have proved of commercial value only within the past decade, one of the most important of which is the metal tungsten, invaluable in steel manufacture. During the past year the department has received, principally through the intervention of Mr. F. L. Hess, of the U. S. Geological Survey, three most remarkable specimens illustrating the three types of ore of this metal. In its own way, each of the three is unique and undoubtedly the largest of its kind ever mined.

The first is a mass of ferberite (iron tungstate) from the No. 7 lease of the Vasco Mining Co., at Tungsten, Boulder County, Colorado, which was presented by the Vasco Mining Co., and Messrs. Stevens and Holland. The specimen is roughly oval in form, 2 feet